

Housing Mobility and Travel Behaviour: A Process-Oriented Approach to Spatial Mobility

Evidence from a New Research Field in Germany

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abstract

During the past years, some effort has been made to understand the location changes in the life course underlying travel demand in Germany. Such studies have presented travel behaviour and long-term housing mobility as intertwined decision flows within the life course. This perspective calls for new methods, f.i. comparisons of travel behaviour before and after relocation, or comparisons between different 'relocation types'. A number of studies have taken on this new perspective. Although there are certain methodological problems arising, notable progress has already been achieved towards a more precise understanding of travel demand. This includes the investigation of the use of transport modes as well as travelled distances and activity spaces. This contribution provides an overview on these studies. Theoretical groundwork, empirically validated aspects, and deficits and blind spots of research are being discussed.

keywords: housing mobility, residential mobility, travel behaviour, activity space, modal choice

1 Introduction

In the last two decades, a large body of research has been published on land-use transport interaction. The primary focus of this research lies on the dependence of distance behaviour and modal choice from spatial structures at an individual's place of residence.

Spatial structures are usually taken as more or less given for an individual or household. However, this viewpoint neglects something central: Spatial structures at the place of residence are also an expression of a household decision for this location. This decision manifests itself either in staying or in moving. Spatial structures may therefore be interpreted not only as a *condition*, but also as a *result* of individual mobility behaviour, even when the high costs of residential moves (information seeking, time, money) work as constraints and cause a degree of persistency of locational decisions. To compare the travel behaviour of

inhabitants of certain areas means therefore not only to compare spatial structures, but also population groups who took a certain locational decision.

Household relocations are special biographical moments, in which familiar routines are broken (Rölle et al., 2001, p. 8-11). Depending on the distance of a move, the accustomed spatial surrounding is being more or less given up, and the habitual pattern of daily mobility has to be rearranged. This leads to complex effects: One may assume that (at least in the case of intra-regional migrations) certain activity places continue to be frequented, f.i. the workplace, the doctor, or some leisure places. Hence, the travel behaviour of in-movers into a certain area might be distinct from the travel behaviour of the long-established population in the same area. This means that the static (cross-sectional) comparison between areas is not sufficient to adequately understand the interrelation between housing and travel behaviour. Instead, housing mobility and travel behaviour should be regarded as an intertwined process of individual behaviour, e.g. by distinguishing groups of different housing mobility in addition to spatially (and/or socio-economically) defined groups.

One finds that such 'dynamic' approaches have already been developed in sociological migration research (Wagner, 1989; Pryor, 1979). However, these are not connected to travel research. The data situation does not permit a direct empirical link to travel behaviour.

In the following pages, central results of the 'traditional' land-use transport approach are being summarised. Thereafter, a framework for a revised study approach is being presented (section 3). Section 4 provides an overview on recent empirical studies. By way of conclusion, an outlook on further research questions will be suggested. This contribution is largely - although not exclusively - based on German studies.

2 Spatial structures and travel behaviour

The said 'traditional' approach to spatial structures and travel behaviour (also known as 'land-use transport approach') generally relies on comparisons of travel behaviour between inhabitants of different areas. Differences are interpreted on the background of spatial differences between the areas. Socio-demographic differences between the areas are often (but by no means always) accounted for. There are numerous examples for this approach on various scales: on the inner city (Holz-Rau and Kutter, 1995; Holz-Rau et al., 1999), the regional (Kagermeier, 1997; Motzkus, 2001), the national (Hautzinger et al., 2000) and on the international scale (Newman and Kenworthy, 1989).

These studies provide evidence for a number of spatial factors influencing travel. They distinguish parameters like density, city size and location, and the spatial distribution of land-use on the one hand, and factors of the transport system (network infrastructure, availability and quality of public transport, pedestrian friendliness etc.) on the other hand.

The results shall not be discussed in detail here. In general they show: The inhabitants of dense, compact core cities cover small distances, compared to the inhabitants of suburban and rural spaces. What is more, the motorisation rate of the former group is relatively low. Public transport and non-motorised modes attain high shares of the modal split (for an overview see Sieber, 2000). This is particularly true for the central mixed-use quarters of the 19th and early 20th century, while in the outer districts the car is more dominating and trips are significantly longer (Holz-Rau et al., 1999; Heydenreich, 2000; Hunecke and Wulfhorst, 2000; Motzkus, 2001). The trip distances appear to depend on the distance to the next centre (Kagermeier, 1997). However, there is no consensus on whether dense, compact structures lead to 'escape mobility' and therefore to longer leisure distances. Fuhrer et al. (1993) are emphatic about this hypothesis, while Kagermeier (1997) cautiously agrees. Other authors emphasise the social rather than the spatial determinants of leisure mobility (Holz-Rau et al., 1999; Meyrat-Schlee, 1993; Holz-Rau and Kutter, 1995).

In general, Anglo-American studies put emphasis on density and city size (overviews in Handy, 1996; Badoe and Miller, 2000; Boarnet and Crane, 2001; Stead and Marshall, 2001; Hickman and Banister, 2002), while there is a stronger focus on the comparison of mixed-use and monofunctional quarters in German research. One reason for this may be the tradition of developing formal mathematical models of spatial behaviour and travel in Anglo-American

research. These models require operationalisable indicators and sufficient spatial data. Density and settlement size fulfil these demands and data is readily available.

Studies on spatial structures and travel behaviour typically confront the problem that spatial and social influences are heavily superimposed on one another. Despite an extensive body of research there is no consensus on the strength of the influence of spatial structures on travel behaviour. After a few years of a certain 'settlement structure euphoria', there is a tendency of doubt recently. Altogether, the impact of spatial structures has probably declined in the past half century with its "revolutions of accessibility" (car, traffic infrastructure, communication technology etc.; Schmitz, 2001).

There is a second problem: Even when demographic and socio-economic variables are being controlled, the uncertainty about the direction of causality of the empirical interrelations remains. Are they impacts of spatial structures on behaviour - or is it the other way round: do individuals or households make their decision for certain spatial structures and - as a result - for a certain type of travel behaviour? There is some evidence that insufficient public transport, unfavourable accessibility and long distances are being accepted by households who attain other advantages in return: quiet location, low price of land, pleasant neighbourhood (s. section 4.4). In contrast, locational decisions for dense, compact, core city structures are essentially tied to brief periods in life cycle (Brake, 2001, p. 22; s.a. Wagner, 1989). In general, one can say that apart from immigrants, it is mainly students, apprentices and entrants (yet with neither children nor car) who tend to move to the inner districts of cities and tend to leave these districts after a couple of years to set up a family in a quieter environment. Residential mobility and travel behaviour are two sides of the same coin: Migration and locational decisions on the one side, and the structure of daily travel behaviour on the other side, are a process of intertwined decisions within the individual biography.

3 Spatial mobility as a process

The studies discussed above essentially rely on a static approach to travel behaviour. Although longitudinal analyses are not uncommon, usually these are comparisons between two or more independent points in time (e.g. Kloas and Kunert, 1993). Hence, independent aggregates are being compared. The development of travel behaviour - cues: increasing distances, increasing car use - is being described as a societal and/or spatial process.

The changes in the life course underlying the development of travel behaviour *on the individual level*, remain unstudied. These changes comprise changing requirements of location and housing that are embedded in the family and employment cycle (Torrens, 2001). Though, f.i., suburbanisation and the motorcar may (with a little exaggeration) be described as a perfect symbiosis (Polster and Voy, 1991; for the USA Putnam, 2000, p. 212), but the logic of action underlying the development of this symbiosis remains obscure. Cause and impact are still unclear: Do people in suburbia use the car because there is no public transport and there are no shops in the neighbourhood - or do only those individuals move to suburbia who already use the car frequently (Albers and Bahrenberg, 1999, p. 23, Boarnet and Crane, 2001, p. 50)? If the latter is true, the hypothesis of spatial determination of mode choice loses its ground.

3.1 Housing mobility and travel behaviour – study approach

If housing mobility and daily mobility are regarded as intertwined, the analytical separation of mobility actions within individual biographies is required. This is shown as a partial model in figure 1.

At a given point t_1 in time, a person takes daily travel decisions and travel actions: decisions for modes, for activity places, for trip start times and so on. Although these procedures are a matter of routine, they are based on decisions (Esser, 1991). These are made on the background of the individual's social position. The term social position has to be understood broadly and includes the life cycle position, family cycle, employment as well as socio-economic resources and the individual lifestyle.

On the other hand, such decisions are also being made on the background of the spatio-temporal context at the place of residence at a given time. Place of residence is not necessarily meant in terms of a municipality or city. According to the degree of specialisation

of an activity, the spatial structures at the neighbourhood level (e.g. shopping) or at the municipal or regional level (e.g. work) may be crucial for the covered distances. Geographic scale matters (Holz-Rau et al., 1999, see also Boarnet and Crane, 2001, p. 81ff).

Level of study

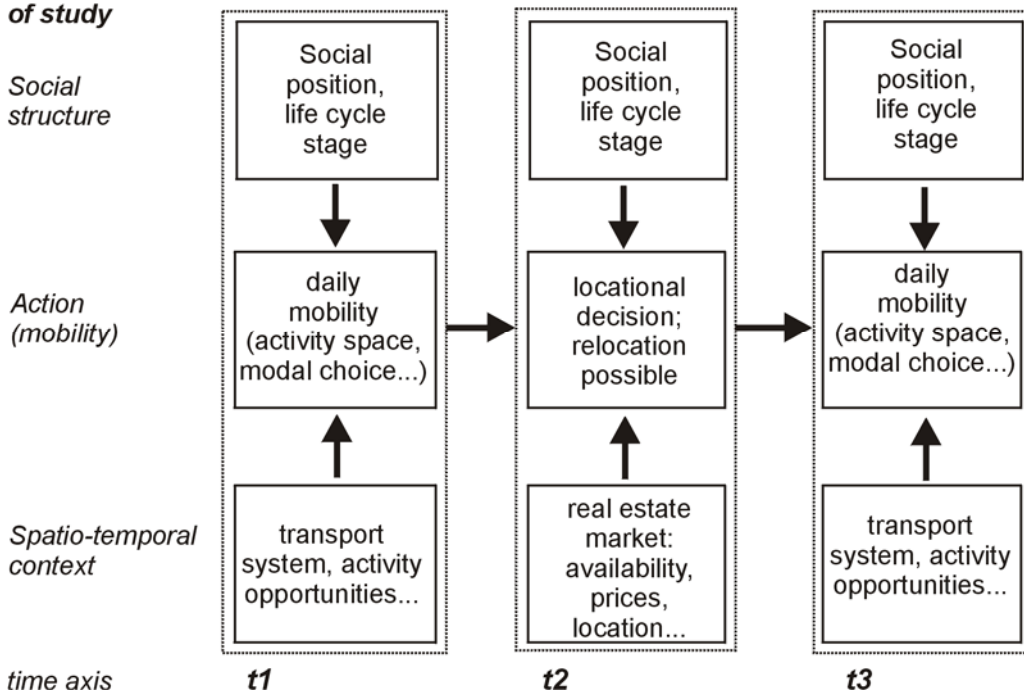


Figure 1: Process model of spatial mobility

Design: Scheiner, based on an idea by Marcel Hunecke and Indra Schweer (Ruhr-University Bochum)

At a point in time t_2 , a locational decision is made. For this decision, a large number of parameters are crucial, e.g. the housing situation, family matters (e.g. expected household changes) and the daily spatio-temporal organisation, which is reflected in the travel behaviour of the household members. The decision may either result in staying or in moving. Again it has to be emphasised that the term 'decision' does not imply permanent consideration. Only if something gives sufficient reason, a relocation is being considered - e.g. serious dissatisfaction with the location, household changes (e.g. birth of a child) or changes of the spatial organisation (e.g. change of workplace). Without reviewing the decision process itself in detail, it is important to recognise that it comprises a complex sequential bundle of single decisions that include the decision to search, the decision to move and the subsequent decisions for a certain type of flat or house, location and housing tenure (Waddell 2001).

For locational decisions, the spatio-temporal context is important as well. The primary factor is the property market (availability, price and spatial distribution of property and dwellings). Transport supply factors are playing an additional role for the locational decision (see section 4.4). If, eventually, the household does relocate, a new set of daily spatial behaviour is being developed, and the process starts over again. Hence, we can distinguish two directions of dependency: The impact of travel behaviour on housing mobility and, vice versa, the impact of housing mobility on travel behaviour. The comprehensive discussion provided by Boarnet and Crane (2001) shows that much more work has been done on the impact of transport on housing mobility, on the aggregate level of transport supply (particularly transport infrastructure) than on the micro level of travel demand. Accordingly, the development of residential locations is interpreted, among other factors, as an outcome of declining travel costs - mainly in terms of travel time - due to the improvement of transport infrastructure.

Quite different considerations may however come into play, if one approaches the problem from the micro level. The impact of individual travel behaviour on housing mobility might first be illustrated with respect to the effect of car availability on migration type: By the very cost of the initial investment, the decision for a motorcar predetermines the future use of transport modes and multiplies the possibilities of a household's locational choices, while the choices of

households without a car depend on access to public transport and the quantity and quality of micro-spatial opportunities.

Secondly, daily spatial orientations, like the location of the workplace or school, social networks or leisure, may affect or even determine locational decisions as well. Some researchers take it for granted that locational behaviour and the location of the workplace and other activity places are independent from each other (Grund, 1997). This proposition, however, relies on an unquestioned agreement between researcher and research object: The regional context is implicitly presumed. Nobody would move to Munich after accepting a job in Hamburg. "The fact that few people explicitly state that access to the workplace is important in their residential choice process does not mean that they do not take it into account, rather they regard it as an essential component of any feasible choice" (Mackett, 1983, p. 84).

Following Alonso's model (1964), it has been a long-standing assumption in urban theory that workplace location is a key determinant for residential location choice. However, much empirical evidence has been provided to contradict this assumption (Waddell, 1993). By means of an event history analysis, Kalter (1994) found that a certain combination of housing and job location is much more often terminated by a change of job than by a change of housing location.

Even though access to the workplace is certainly not an irrelevant location criteria, a significant weakening of this connection - and the transport land-use connection in general - has been observed within the last decades. It is reflected in increasing travel distances that exceed the distances necessary to get access to opportunities such as shopping centers or workplaces (compare the debate on 'wasteful commuting', Hamilton, 1989; Frost et al., 1998). The main reasons for this weakening are the ongoing extension of transport infrastructure, increasing motorisation, increasing welfare, and declining relative costs of transport (Orfeuill and Salomon 1993).

Housing location decisions are often based on a trade-off between low housing costs on the one hand, and high transport costs on the other hand (Boarnet and Crane 2001). These trade-offs lead to the fulfilment of the most important housing wishes (green, quiet, safe) while other - apparently less important - wishes stay unfulfilled (proximity to retail, services, and public transport) (StadtLeben, 2002; Bauer et al., 2003). This assumption is in line with general action-theoretical models of maximising individual utility (Esser, 1991). Yet, it is noteworthy that such trade-offs are only possible when land markets and transport markets are working to near perfection.

Vice versa, housing mobility influences travel behaviour in a number of ways. These are being considered more frequently in research than the reverse impacts of travel on housing mobility. This is due to certain conceptual models of spatial mobility that propose a sequential, hierarchical process of long-term and short-term decisions. Ben-Akiva and Lerman (1979) as well as Salomon (1983) regard choice of residential location and workplace location, automobile ownership and mode to work as long-term decisions, while short-term decisions on daily non-work travel (trip frequency, destination, mode, route, time of day) are made conditional on these long-term decisions. Salomon (1983) adds the longest-term life decisions on a certain lifestyle to this two-stage hierarchy.

In more specific terms, a relocation might imply changes in the spatial distribution of activities, the daily distances, or the use of transport modes. Various aspects of migration play a role in this context:

1. Locational decision (destination of migration): As was shown in section 2, mode use, activity spaces and covered distances strongly correspond to the locational decision.
2. Place of origin (departure of migration): Changes in travel behaviour after a migration not only depend on the chosen place of residence, but also on the previous location. E.g., after a tangential migration within the suburban space, neither mode use nor distances must necessarily change.
3. Migration distance: Long-distance migration often results in long travel distances, primarily for activities like private visits to the former place of residence. In double-income

households, relocating closer to the workplace of one partner might lead to longer travel distances for the other.

Changes in travel behaviour are caused not only by migration, but also by decisions against migration, e.g. when activity places (like workplace) or travel resources change (e.g. cessation of a bus line, change of car availability). In this context, it is the substitution of migration by commuting that is becoming increasingly important (Kalter, 1994). On the one hand, changes of the workplace have become more frequent due to the deregulation of the labour market and increasing social mobility (Klammer and Tillmann, 2001). On the other hand, however, individual ties to the place of residence become ever stronger for several reasons: the increasing rate of homeowners compared to tenants, the increasing share of double-income households, and the increasing occupational uncertainty that makes a relocation after a change of workplace appear unreasonable or hasty.

The decision to maintain the place of residence while the workplace location (or another aspect of travel behaviour) is changing means that a person or household accepts the travel options presented by the spatial configuration at the current place of residence. As a consequence, such a decision might also be interpreted 'conventionally' as the impact of spatial structures. For a further examination of this problem, the subjective meaning of locational factors for an individual's locational decision has to be considered in addition to objective spatial factors (Boarnet and Crane, 2001; StadtLeben, 2002).

3.2 *Spatial mobility throughout the life cycle: some remarks*

So far, only the interrelation between housing mobility and travel behaviour has been considered. Housing mobility itself is, however, strongly connected to other biographical changes in the course of the life cycle, e.g. moving out of the parents' house, starting a family, workplace/career decisions, retirement. The life cycle concept is considered the best explanatory approach for internal migration within a country (Bähr, 2003). The cohort analysis conducted by Wagner (1989) provides impressive evidence for this. According to multivariate analyses, age (as a proxy variable for life cycle phases) is the dominant explanatory variable for the individual migration frequency and duration of residence in the neighbourhood (StadtLeben, 2002).

This means that housing mobility may be viewed not only as an explanatory factor for travel behaviour, but as an endogenous variable in its own right (Simpson, 1987; Waddell, 2001; Boarnet and Crane, 2001). Therefore, a process-oriented approach to spatial mobility must involve not only one step back in time (e.g. from the t_3 to t_2 in figure 1), but to step back even further, based on the life cycle concept and the biographical experiences of the actors. For lack of space, this will only exemplarily be pointed out.

It has frequently been stated that travel behaviour of adults is predetermined by childhood socialisation (Flade and Limbourg, 1997; Heine and Mautz, 2001), although there is no conclusive evidence for that. Concerning housing mobility, it has been shown that individuals who frequently moved during childhood, tend to move frequently as adults (Wagner, 1989, p. 163f). In addition, there is some evidence that growing up in a certain spatial environment influences future locational decisions as adults (Bauer et al., 2003).

It may be assumed that a high percentage of individuals return to their place or region of origin after their education and post-adolescent 'years of travel', e.g. to care for their parents, to take over the parents' house, or to re-establish old friendships or habits. The returns are reflected in the share of Germans living at their birthplace, which is slightly increasing from the age of forty onwards (Wagner, 1989, pp. 167-71 and 202). However, among these, the relative share of 'returnees' as against those who never left remains unknown.

Return migration probably involves a high degree of mobility for private visits. For elderly citizens it has been shown that short duration of residence in a municipality is associated with a high share of leisure activities outside the region, even when age and other socio-demographic attributes are being controlled. There is also evidence for long-term ties to the location of the former workplace, even after many years of retirement (Scheiner, 2003).

3.3 Methodological problems

Methodologically, one may break down the process in figure 1 into single steps to allow for conclusions about certain interrelations. Daily mobility may be recorded for two points in time before and after migration. Changes may then - allowing for other influences, e.g. changes in the household structure - be interpreted as caused by migration. Vice versa, the relevance of certain aspects of daily mobility (such as distance to opportunities, car availability) for the decision to move or the decision for the chosen location may be recorded. However, there are some methodological problems:

Lack of data: For secondary analyses there is little relevant data available. Travel surveys usually do not include former places of residence, while migration studies do not include travel data. The only source of information available consists in panel data. Yet, the results of such studies confront the problem of 'panel mortality' that particularly appears when exceptional occurrences in the household take place - like relocations. Thus, the German Mobility Panel (since 1994) hardly allows for the investigation of effects of migration on travel behaviour (Kloas et al., 2001, p. 76).

Definition of study units: An individual does not a priori belong to a certain household. Individuals leave households, enter other households, found new households etc. The result may be serious difficulties in making the link between individual travel behaviour and household migration behaviour an operationalisable one.

Problems of measurement and operationalisation: The high complexity and costs of panel surveys are often avoided by retrospective methods with restricted validity. What is more, panel studies confront the problem of lack of knowledge about long-term effects, retarded effects and stability of effects. Alternatively, one may work with bridge hypotheses, e.g. by comparing incomers and long-established in cross-sectional data. However, changes in travel behaviour after a relocation cannot be investigated this way.

Problem of causal hypotheses: At the moment of the migration decision or migration, a household may have had a structure totally different from that at the time of the survey (Mackett, 1983, p. 86). Equally, household changes might have been anticipated at this point in time (e.g. change of housing needs of couples who want children). Thus, all hypothetical determinants of migration and locational choice have to be recorded with respect to the time *before* the migration. But even when the chronology of household structure, motorisation etc. is known, causality can not simply be assumed: Possibly a child was born a year after a relocation - but it was anticipated and therefore the migration motive.

4 Housing mobility and travel behaviour – studies from Germany

In recent years, a number of studies on the link between housing mobility and travel behaviour have been conducted in German speaking countries. In the following section, the main results of these are being presented. Four points are to be stressed:

- Activity spaces and distance behaviour before and after migration;
- mode use before and after migration;
- decision between migration and commuting;
- travel and accessibility as criteria for locational choice.

4.1 Activity spaces and distance behaviour before and after migration

An early study on the change of commuting distances caused by migrations was conducted by Arend and Gottardi (1994). According to them, more than half (57 percent) of all household relocations in the study area (a part of Switzerland) led to changes in commuting distances travelled by car. Among these, there are about equally as much cases of reduced (26 percent) and increased distance (31 percent). However, the migrations were not differentiated spatially.

Travel induction is often ascribed to suburbanisation. Consequently, a number of studies focus on travel effects of migrations to suburbia. In the suburban space of Berlin, Holz-Rau (2000) shows that the long-established population of the larger municipalities displays a comparatively strong orientation towards their own place of residence (figure 2). This is

equally true for job, leisure and shopping trips. However, the local supply does obviously not have any effect on in-movers ('new suburbanites'). These maintain their job, shopping and leisure orientation towards Berlin. The persistence of the orientation of 'new suburbanites' towards the core city has also been shown for commuting trips in Munich (IMU-Institut, 2002, p. 111), Dortmund (Stadt Dortmund, 2001, p. 16) and Hamburg (Grossmann+Berger Immobilien, 2000, p. 48). However, Holz-Rau (2000) points out that the core city orientation concerning commuting trips decreases with increasing duration of residence in the periphery. This trend appears to be the consequence of time-lagged changes of workplace.

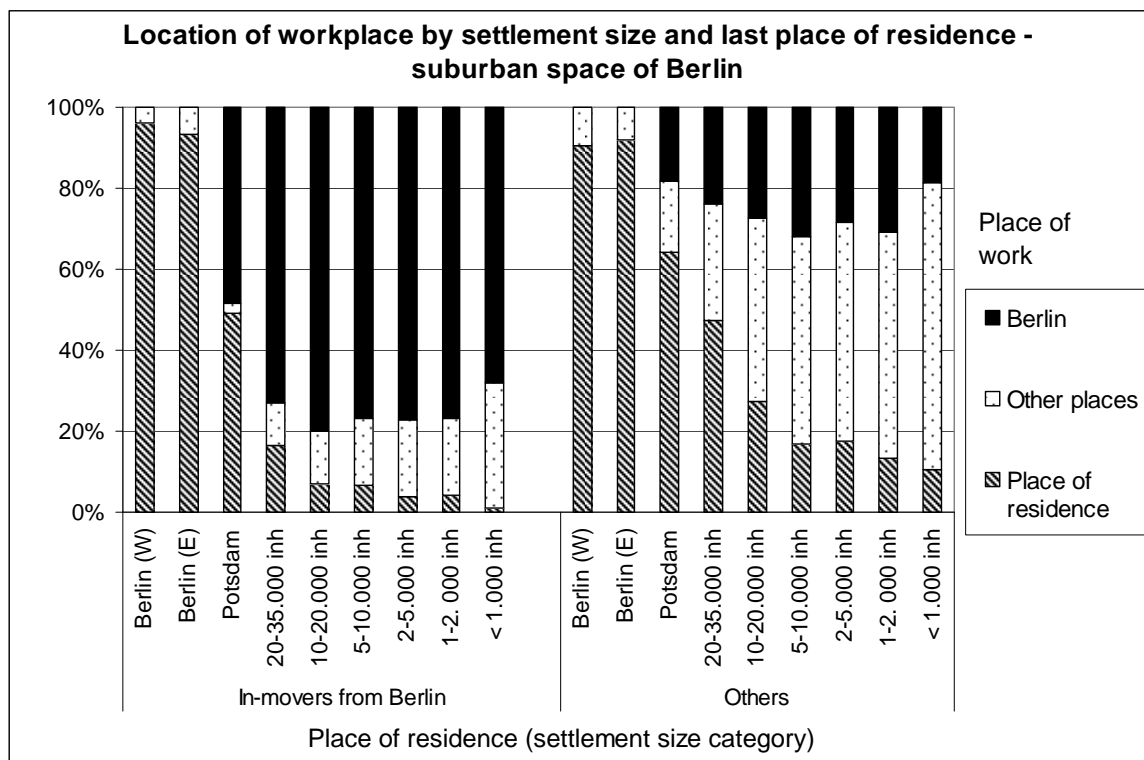


Figure 2: Location of workplace by settlement size and last place of residence - suburban space of Berlin

inh: inhabitants.
 Source: Holz-Rau (2000)

Scheiner (2000) compares activity spaces of individuals in the Eastern and Western part of Berlin. The findings confirm similar ties to the former place of residence (East or West Berlin). While West-Berliners tend to undertake their activities in the Western part of the city, East Berliners *living in the same neighbourhood* tend to choose their activity places in the Eastern part. Duration of residence in Berlin and spatial origin (East or West) prove to be the best predictors of the spatial distribution of activity places over the Eastern and Western part of Berlin. Their explanatory value is considerably higher than the value of socio-demographic attributes (Scheiner, 2000, p. 236ff).

In contrast to that, in an inner city study in Cologne, interrelations between activity places and former place of residence were found only with respect to few types of activity, namely for private matters and private visits (StadtLeben, 2002).

Kloas et al. (2001, pp. 118-37) investigate not only moves to the suburbs, but also moves to cities. Based on multiple regression analyses of the German mobility panel data (1994-9), they provide evidence that travel distances increase by 140 km per capita and week after moving to a less dense area, even when socio-demographics, car availability and spatial structure are being controlled. Vice versa, travel distances decrease after moving to a denser area. The effects of migration are considerably higher than those of the settlement structure at the place of residence.

4.2 Car availability and mode use before and after migration

When behaviour routines are broken by a relocation, mode use often changes as well. With reference to three neighbourhoods in Cologne, figure 3, shows that only about half of the interviewees who had moved between 1989 and 2001 use a certain travel mode equally as often as before the move. The ratios vary between the different travel modes. Public transport use changes most significantly. A third of the interviewees use public transport after the relocation more infrequently than before, but only a fifth use it more frequently than before.

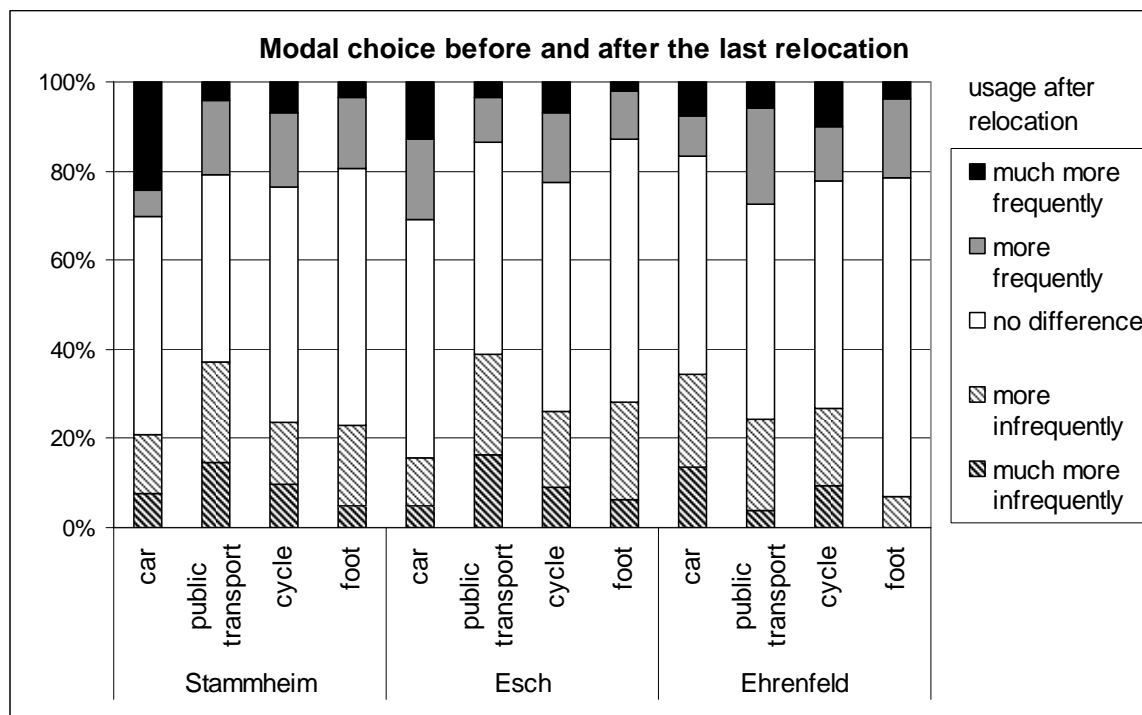


Figure 3: Modal choice before and after the last relocation (Cologne)

Source: Stadtleben (2002)

The shifts are varying with respect to the destination of the move. Moving to Ehrenfeld is associated with frequent car use in favour of public transport and foot trips. Ehrenfeld is an inner city quarter with an excellent public transport service and an outstanding quantity and quality of local supply facilities¹.

Moving to Esch, a suburban neighbourhood at the periphery of Cologne, involves more frequent car use at the expense of public transport and foot trips. For commuting trips, this has also been shown for Munich. After moving from Munich to the outskirts, the share of non-motorised modes decreased from 12 to 6 percent, the share of public transport halved from 31 to 15 percent (IMU-Institut, 2002, pp. 112-3).

Herfert (1997) investigates car availability before and after moving to the suburbs of the East-German cities of Schwerin, Cottbus, Leipzig und Dresden. According to his results, suburbanisation has a considerable impact on car availability. Table 1 shows the increase of second cars for the extreme case of Schwerin, and the somewhat weaker shift in the region of Munich. At the same time, the table shows that travel decisions precede the move: Households without a car usually do not move to suburbia. 98 percent of the households who migrated to the fringe of Schwerin already owned one or more cars before the move (East Germany 1995: 65 percent²). Thus, there are mutual influences between housing mobility and travel behaviour. There is no clear direction of cause and effect.

In this example, the car could also be purchased in preparation of the move. A more complex causal chain is possible as well: E.g., an individual finds a new workplace in the periphery that

¹ Similar modal shifts were observed in inner city quarters in the Netherlands (Smets, 2000).

² Author's own calculation on the basis of the Socio-Economic Panel.

requires a car. The car in turn facilitates the move to the suburbs. This would be an example for the influence of spatial structures (distribution of workplaces) on travel behaviour and housing mobility.

However, for households moving to suburbia there are margins of choice between suburban locations with stronger or weaker car dependency (Heine and Mautz, 2001). In the region of Dresden it has been shown that the number of cars per household moving to suburbia increases markedly for households moving to small villages, but not for households moving to bigger municipalities in the region (Bauer et al., 2003).

cars per household	Schwerin			München		
	before relocation	after relocation	difference	before relocation	after relocation	difference
0	2,2	1,5	-0,7	17,5	10,7	-6,8
1	70,8	35,8	-35,0	54,7	49,8	-4,9
2 +	27,0	62,7	+35,7	27,8	39,5	+11,7
all	100,0	100,0	0,0	100,0	100,0	0,0

Table 1: Changes in car availability after moving to the suburbs: the cases of Schwerin and Munich

Source: Herfert (1997) (Schwerin), IMU-Institut 2002 (München)

The hypothesis that car use in suburbia is not enforced by suburban spatial structures but an effect of socially selective suburbanisation ('households moving to suburbia use the car anyway, no matter where they live'), is right to a certain extent - but it does not tell the whole story, as mode use apparently shifts significantly after moving.

There are much fewer studies on urbanisation in this regard. Rölle et al. (2001) show for the city of Stuttgart that after interregional migrations a high percentage of in-movers use public transport although they had not done so at their former place of residence. Furthermore, an experimental sub-sample got some public transport incentives (test ticket, information on public transport in Stuttgart). The test persons could not detect the connection between the incentives and the study. In the experimental group, the share of public transport was yet higher, even eight months after the experiment. Obviously there is a noteworthy potential of the population for mode changes in favour of public transport.

A prominent hypothesis states that increasing car use cannot be reversed, because the car provides so many options for socio-spatial relations and such a high degree of individual autonomy that a reversal would practically mean social disintegration (Krämer-Badoni and Kuhm, 2000). However, this hypothesis does not fully meet the facts. The discussed shifts in favour of the environmentally friendly modes after relocations to areas with good public transport and good micro-spatial supply facilities provide evidence to the contrary.

4.3 Commuting or migrating?

The discussed interrelation is not restricted to realised relocations, but also includes 'refrained housing mobility', i.e. the decision to keep the place of residence after a change in the daily spatial orientation. This is particularly important with respect to the decision between commuting and migrating. Van Ommeren et al. (2000) and Kalter (1994) developed theoretical models for this decision, which are based primarily on migration costs, commuting costs, labour market and housing market conditions.

According to Kalter (1994), the ever higher number of long-distance commuters reflects the increasing inclination to keep the existing place of residence. Long-distance commuting becomes a substitute for migration. Between 1985 and 1997, the share of long-distance commuters (> 50 km single trip) among all employees in Germany rose from 2.6 to 6.6 percent (Vogt et al., 2001:560). For some long-distance commuters, commuting is only a precursor of migration or a short-term substitute for a job move. But for no less than 64 percent of all long-

distance commuters (other employees: 71 percent), the combination of workplace and place of residence remains stable for at least five years. For 46 percent of the long-distance commuters (others: 57 percent) it remains stable for at least ten years (Kalter, 1994, p. 465, for similar results see Vogt et al., 2001, p. 560). The increasing substitution of migration by commuting is also reflected by the growing number of LAT couples (living apart together) and weekend commuters (Schneider et al., 2002).

Not only by moving job, but also by moving residence can one become a long-distance commuter. The ongoing expansion of suburbia into 'second rings' far from the core city reflects this development (Aring and Herfert, 2001). In the outskirts of Stuttgart, the share of long-distance commuters increased markedly mainly in municipalities with unfavourable accessibility. These municipalities are attractive for suburbanising households because of their comparatively low land prices (Vogt et al., 2001, p. 102).

**4.4 Turning round the interrelation:
 travel and accessibility as criteria for locational choice**

Housing mobility and locational choice do not only influence travel behaviour. Travel behaviour, travel chances and accessibility of opportunities may also be criteria or even conditions for locational decisions and/or for the decision to move, as has been shown at the example of car availability and suburbanisation. Non-motorised households are particularly likely to take public transport and accessibility of micro-spatial opportunities into account, while the locational choices of car households are less restricted because of the ubiquity of the road networks (Van Wee et al., 2002; see example suburbanisation in chapter 4.2).

Holz-Rau and Kutter (1995) show that in suburban municipalities in the region of Stuttgart with rapid transit system (S-Bahn) the share of public transport commuters is higher than in municipalities without such systems. In absolute numbers, however, there are equally as many car commuters in these municipalities as in other municipalities. The public transport commuters did not switch from car to public transport. They are additional commuters - possibly individuals whose relocation to suburbia was induced by the rapid transit system.

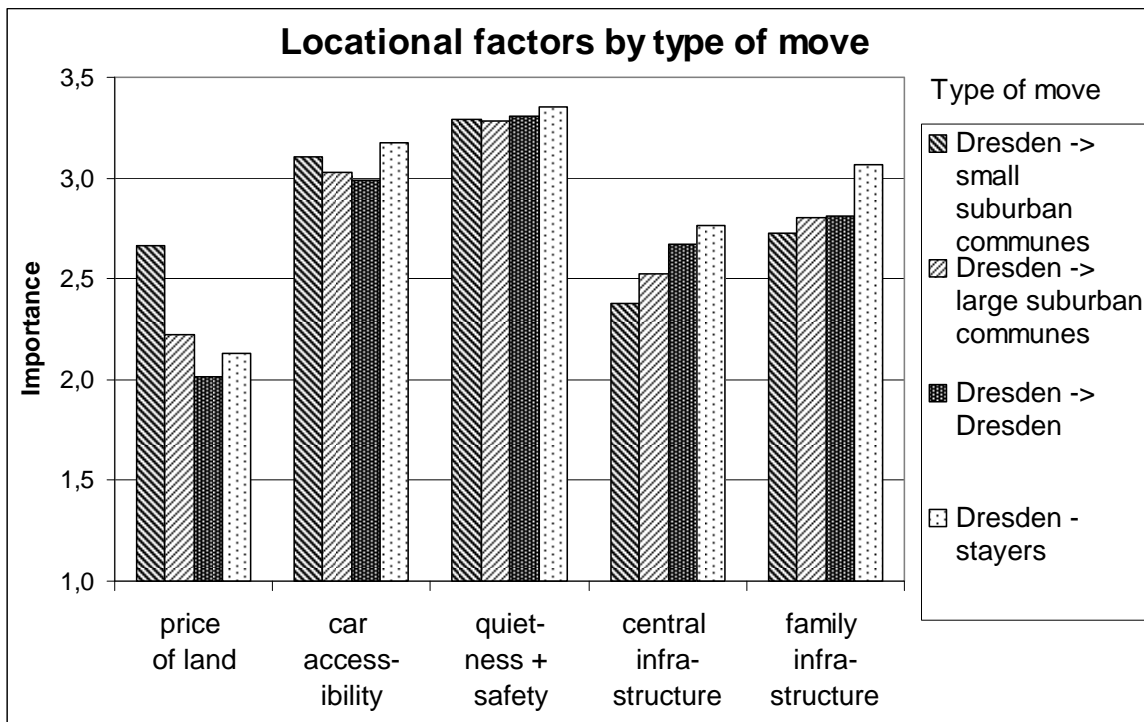


Figure 4: Who moves to which type of location? - Locational factors by type of move (region of Dresden)

Importance measured by a rating scale ranging from 1 (unimportant) to 4 (very important).
 Source: Bauer/Holz-Rau/Scheiner (2003)

Not only the location of activity places, but also the transport system is an important locational criterion. In Munich, 69 percent of the suburbanised households stated that the distance to the next rapid transit station was an important precondition for locational choice (IMU-Institut, 2002, p. 102-3).

Many authors regard daily spatial behaviour and accessibility as minor criteria for locational decisions. Grund (1997, p. 58) claims that "employees look for a favourable workplace independently from their residential location". One may object against this argument that for interregional migration, vocational reasons are by far the most important reasons, as is well-known (see e.g. for Frankfurt/Main Dobroschke, 1999). For intra-regional migrants, locational factors such as quietness and safety are of major relevance (figure 4). However, infrastructure plays a certain role as well, especially for households moving to larger municipalities or staying in the core city. The sectoral shape of suburbanisation (households in the south-west of a core city usually move to the south-western outskirts) reflects the attempt to keep up daily relationships after migration (Adams, 1969; IMU-Institut, 2002).

However, semi-structured interviews in a suburban quarter in Cologne show that travel behaviour is not only a reflection of a conscious decision for a certain location. There are wrong decisions that are compensated by travel behaviour that was not forecast before the relocation: "Except for the KVB (Cologne transport services, J.S.) everything turned out to be as we had expected it. We have been starry-eyed. We thought, okay, there is a bus stop (...). The bus stop is there, but there is no bus!" (StadtLeben, 2002, p. 77). With respect to this, improved location information could possibly open up a certain potential for influencing household locational choices (Beckmann, 2003).

However, as mentioned before, a significant weakening of the transport land-use connection has been observed within the last decades. Among other reasons, this is caused by increased access. It allows a certain trade-off in location decisions: low housing costs and the fulfilment of the most important housing wishes (green, quiet, safe) on the one hand against high transport costs, long distances to retail, services, workplace and schools, and insufficient public transport connection on the other hand (Heine and Mautz, 2001; StadtLeben, 2002; Bauer et al., 2003). This type of trade-off is likely to be particularly marked in Germany, because transport costs in Germany are comparatively low, while housing costs are high. Based on relative purchasing power, the prices of cars, as well as gasoline prices are the lowest among 16 European countries, except for Switzerland (Bovy et al., 1993). At the same time, there is no other European country where the costs of building a home are as high. E.g., "the hours of work required in order to earn sufficient money to purchase a house are three times higher than in Britain" (Derichs, 2003, p. 1). However, the assumption that for this reason traffic growth is particularly high in Germany, is not true. The growth rates from 1970 to 1987 ranged around European average (Bovy et al., 1993).

5 Outlook

Based on a number of studies, the mutual interrelations between housing mobility and travel behaviour have been discussed. Activity spaces, covered distances and mode use – they all change after a relocation. At the same time routines of mode use, as well as the location and distance of daily activity places, are causes for migration and criteria of locational choice. Spatial mobility can hence be regarded as a process of intertwined long-term and short-term decisions. Because migration is closely related to life cycle stages, it might be possible to reduce these mobility processes to a (small?) number of typical individual mobility biographies. There are no studies on this topic so far, though the methods of 'residence history analysis' could provide a useful starting point (Pryor, 1979; Wagner, 1989, p. 54ff).

On the whole, the presented results - the complex patterns of residential mobility and their interlinkages to travel behaviour - challenge the view that travel behaviour is highly influenced by the spatial structures at a given place of residence. It seems that some aspects of travel behaviour can better be explained by attributes of housing mobility (type of move, place of origin, duration of residence) than by conventional socio-demographic attributes of a person and spatial attributes of the actual place of residence. This underlines the well-known fact that travel behaviour has significantly disassociated itself from spatial as well as from social structures, on the one hand because of the 'revolutions of accessibility' (Schmitz, 2001)

represented by car and telecommunication, on the other hand because of the differentiation of lifestyles and milieus that only partly correspond to social structures (Hunecke and Wulfhorst, 2000; Scheiner and Kasper, 2003).

Some of the causes of travel behaviour lie in long-term persistent ties to former locations that can be explained by individual biographies. Possibly this is also true for mode choice. These long-term ties imply travel behaviour that seems diffuse and not explainable in 'traditional' cross-sectional examinations. As a matter of course, conventional approaches are not becoming obsolete. However, they have to be complemented by process-oriented approaches that consider individual life courses and housing biographies as important components for a better understanding of travel behaviour. There are a number of blind spots of research:

1. Existing studies are strongly based on suburbanisation. Other migration types are rarely considered. The developing 'maturity' of suburbia entails a growing number of tangential migrations within the suburban spaces (Aring and Herfert, 2001). Which consequences do they have for daily mobility? Studying the (comparatively small) number of migrations from suburbia to the cities could give valuable insight into locational criteria and consequences for travel as well. Linking such studies to analyses of the official migration statistics could even lead to an estimation of the overall travel effects of migration.
2. Existing studies are often restricted to commuting trips, while detailed investigations of other trip purposes are rarely available. Travel behaviour is unlikely to be equally enduring for all trip purposes. Compensatory effects are possible, e.g. longer commuting distances but shorter leisure distances after a relocation.
3. An open question is the strength of the discussed interrelations, e.g. between the relevance of locational factors and the realised locational decision.
4. Concerning mobility biographies, one question is of major importance: Which relevance have places of residence, location types and travel behaviour during childhood with respect to locational behaviour and travel behaviour in adulthood?

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